Third written homework, due Monday February 4

Part I: Areas

1. Consider a triangle with vertices at (0,0), (3,0) and (0,8).
a) Write down an integral that computes the area of this triangle with vertical slices.
b) Write down an integral that computes the area of this triangle with horizontal slices.
c) Compute the integrals. (This part is easy, and is mostly a check that you didn't make a calculational error. Of course the answer should agree with the familiar "one half base times height" formula.)

2. Now consider a triangle with vertices at (0,0), (3,0), and (5,8).
a) Write down an integral the computes the area with horizontal slices. (This should look familiar.)
b) What goes wrong when you try to slice vertically instead? How can you get around this difficulty?
c) Write down an expression that computes the area with vertical slices.

3. Now consider an arbitrary triangle with base along the x-axis and third vertex somewhere in the upper half plane. That is, you can take the three vertices to be (0,0), $(b, 0)$, and (a, h), where a, b, h are constants. By slicing horizontally, compute the area of this triangle in terms of a, b and h. (Again, finding the formula isn't the point — we all know "one half base times height". The point is deriving this formula with calculus, and the remarkable fact that the area doesn't depend on a.)

Stewart Section 6.1 (page 427), problems 7, 11 and 47ab. (That is, only do parts a and b of problem 47)

Part II: Volumes. Stewart Section 6.2 (page 436), problems 19, 20, 47, 52 and 63.